

Claims

1. Method for the differentiated digital processing of a sound signal, constituted in the interval of a frame by the sum of sines of fixed amplitude and of which the frequency is modulated linearly as a function of time, this sum being modulated temporally by an envelope, the noise of said sound signal being added to said signal, prior to said sum,
5 characterized in that it comprises:
a stage of analysis making it possible to determine parameters representing said sound
10 signal by
- a calculation of the envelope of the signal,
 - a calculation of the period of the fundamental of the voice signal (pitch) and of its variation,
 - an application to the temporal signal of the inverse variation of the pitch,
 - 15 • a Fast Fourier Transformation (FFT) of the pre-processed signal,
 - an extraction of the signal frequential components and their amplitudes from the result of the Fast Fourier Transformation,
 - a calculation of the pitch and its validation in the frequential domain,
 - an optional elimination of the ambient noise by selective filtering before
20 coding.
2. Method according to claim 1,
characterized in that it furthermore comprises a stage of synthesis of said
representative parameters making it possible to reconstitute said sound signal.
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3. Method according to the preceding claims,
characterized in that it furthermore comprises a stage of coding and of decoding of
said representative parameters of said sound signal.
- 30 4. Method according to the preceding claims,
characterized in that it furthermore comprises a stage of filtering of the noise and a
stage of generation of special effects, from the analysis, without passing through the
synthesis.

5. Method according to the preceding claims,
characterized in that it furthermore comprises a stage of generation of special effects
associated with the synthesis.

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6. Method according to claim 2,
characterized in that said stage of synthesis comprises:

- a summing of the sines of which the amplitude of the frequential components
varies as a function of the envelope of the signal and of which the frequencies
vary linearly,
- a calculation of the phases as a function of the frequencies value and of the
values of phases and frequencies belonging to the preceding frame,
- a superimposition of the noise,
- an application of the envelope.

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7. Method according to claim 4,
characterized in that said stage of filtering of the noise and said stage of generation of
special effects, from the analysis, without passing through the synthesis, comprise a
sum of the original signal, of the original signal shifted by one pitch in positive value
and of the original signal shifted by one pitch in negative value.

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8. Method according to claim 7,
characterized in that said shifted signals are multiplied by a same coefficient, and the
original signal by a second coefficient, the sum of said first coefficient, added to itself,
and of said second coefficient is equal to 1, reduced in order to retain an equivalent
level of the resultant signal.

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9. Method according to claim 7,
characterized in that said stage of filtering and said stage of generation of special
effects, from the analysis, without passing through the synthesis, comprise:

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- a division of the temporal value of the pitch by two,
- a modification of the amplitudes of the original signal and of the two shifted
signals.

10. Method according to claim 7,

characterized in that said stage of filtering and said stage of generation of special effects, from the analysis, without passing through the synthesis, comprise:

- 5 • a multiplication of each sample of the original voice by a cosine varying at the rhythm of half of the fundamental (multiplication by two of the number of frequencies), or varying at the rhythm of one third of the fundamental (multiplication by three of the number of frequencies),
- then an addition of the result obtained to the original voice.

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11. Method according to claim 5,

characterized in that said stage of generation of special effects associated with the synthesis comprises:

- 15 • a multiplication of all the frequencies of the frequential components of the original signal, taken individually, by a coefficient,
- a regeneration of the moduli of the harmonics from the spectral envelope of said original signal.

12. Method according to claim 11,

20 characterized in that said multiplication coefficient of the frequential components is:

- a coefficient dependent on the ratio between the new pitch and the real pitch,
- a coefficient varying, periodically or randomly, at low frequency.

13. Device, for the carrying out of the method according to claim 1, for

25 differentiated digital processing of a sound signal, constituted in the interval of a frame by the sum of sines of fixed amplitude and of which the frequency is modulated linearly as a function of time, this sum being modulated temporally by an envelope, the noise of said sound signal being added to said signal, prior to said sum, characterized in that it comprises:

- 30 - means of analysis making it possible to determine parameters representative of said sound signal, and/or
- means of synthesis of said representative parameters making it possible to reconstitute said sound signal, and/or

- means of coding and of decoding said parameters representative of said sound signal, and/or
- means of filtering the noise and of generation of special effects, from the analysis, without passing through the synthesis, and/or
- 5 - means of generation of special effects associated with the synthesis.

14. Device according to claim 13,

characterized in that said means of analysis comprise:

- means of calculation of the envelope of the signal,
- 10 • means of calculation of the pitch and of its variation,
- means of application of the inverse variation of the pitch to the temporal signal,
- means for the Fast Fourier Transformation (FFT) of the preprocessed signal,
- means of extraction of the frequential components and their amplitudes from said signal, from the result of the Fast Fourier Transformation,
- 15 • means of optional elimination of the ambient noise by selective filtering before coding.

15. Device according to claim 13,

characterized in that said means of synthesis comprise:

- 20 • means of summing sines of which the amplitude of the frequential components varies as a function of the envelope of the signal,
- means of calculation of phases as a function of the frequencies value and of the values of phases and frequencies belonging to the preceding frame,
- means of superimposition of noise,
- 25 • means of application of the envelope.

16. Device according to claim 13,

characterized in that said means of filtering of the noise and of generation of special effects, from the analysis, without passing through the synthesis, comprise means of
 30 summing of the original signal, of the original signal shifted by one pitch in positive value and of the original signal shifted by one pitch in negative value.

17. Device according to claim 16,

characterized in that said shifted signals are multiplied by a same coefficient, and the original signal by a second coefficient, said sum of said first coefficient, added to itself, and of said second coefficient is equal to 1, reduced in order to retain an equivalent level of the resultant signal.

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18. Device according to claim 13,
characterized in that said means of filtering and of generation of special effects, from the analysis, without passing through the synthesis, comprise:

- means of division of the temporal value of the pitch by two,
- 10 • means of modification of the amplitudes of the original signal and of the two shifted signals.

19. Device according to claim 13,
characterized in that said means of filtering and of generation of special effects, from
15 the analysis, without passing through the synthesis, comprise:

- means of multiplication of each sample of the original voice by a cosine varying at the rhythm of half of the fundamental (multiplication by two of the number of frequencies), or varying at the rhythm of one third of the fundamental (multiplication by three of the number of frequencies),
- 20 • means of then adding the result obtained to the original voice.

20. Device according to claim 13,
characterized in that said means of generation of special effects associated with the synthesis, comprise:

- 25 • means of multiplication of all the frequencies of the frequential components of the original signal, taken individually, by a coefficient,
- means of regeneration of the moduli of the harmonics from the spectral envelope of said original signal.

30 21. Device according to claim 20,
characterized in that said multiplication coefficient of the frequential components is:

- a coefficient dependent on the ratio between the new pitch and the real pitch,
- a coefficient varying, periodically, at low frequency.